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BALLAST WATER MANAGEMENT HEARING

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TESTIMONY OF

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NORTHEAST-MIDWEST INSTITUTE

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Good morning, and thank you for the opportunity to testify before this joint hearing by the Subcommittees on Water Resources and Environment, and Coast Guard and Maritime Transportation of the Transportation and Infrastructure Committee. This hearing is extremely timely given recent negotiation by the International Maritime Organization of the "International Convention for the Control and Management of Ships' Ballast Water and Sediments", and the urgent need for Congress to reauthorize the National Invasive Species Act of 1996.

Invasive species issues have risen to the forefront of natural resource conservation concerns over the past decade. The statistics on economic impacts, often quoted and always staggering, range into the billions of dollars. The permanent degrading changes to US coastal and inland aquatic systems caused by invasive aquatic organisms affect the standard of living, recreation, employment, and health of the American public. With states stepping into the breach to establish local and sometimes conflicting regulations to enhance prevention, the need for a federal program that effectively and credibly will prevent further such damage is grave.

My role and interest in this field began in 1989 when, as Great Lakes Task Force Coordinator, I assisted Senator Glenn and Congressman Nowak in gaining enactment of the first national legislation regulating discharges of aquatic invasive species from ships, the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990. As Senior Policy Analyst at the Northeast-Midwest Institute, I then assisted Senator Glenn and Congressman LaTourette in achieving enactment of the reauthorization of that law, the National Invasive Species Act of 1996. At the same time, the Northeast-Midwest Institute began a partnership with the Lake Carriers' Association to examine ballast treatment options for ships entering the Great Lakes. The two organizations raised funds from the Great Lakes Protection Fund, Environmental Protection Agency, the National Oceanic and Atmospheric Administration among other sources to conduct first-hand high flow tests of promising ballast treatment methods on a barge-based platform located in Duluth-Superior Harbor, and on ships plying the Great Lakes and West Coast. The results of this work can be viewed on our Website (www.nemw.org).

Commercial vessels are the leading vector of unintentional introductions of aquatic invasive organisms into US waters. Ballast water exchange, a ship operation designed to purge near coastal organisms in the high seas, has long been regarded as a faulty but useful stop-gap measure to help attenuate ship-mediated organism transfers. The list of limitations associated with this method is long and of concern to environmental and maritime interests alike. A rapid transition from BWE to effective ballast water treatment is a stated goal in the National Invasive Species Act, and internationally through the International Maritime Organization. Such a transition is particularly important for the Great Lakes region, where the preponderance of ships enter the lakes with only unpumpable -- yet fertile -- ballast residuals from foreign ports. Ballast water exchange of this water is not an option on the voyage into the lakes, and only treatment can eliminate the risk of organism transfer. As a source of water for households, power plants and manufacturing facilities, the Great Lakes are vulnerable to profound impacts by invasive organisms, yet a Great Lakes-only solution is a fallacy given the many ways organisms can spread intracontinentally. The only way to protect an ecosystem like the Great Lakes is through an effective prevention net cast nationally and internationally.

This hearing seeks to investigate the potential relationship between the International Maritime Organization's (IMO) International Convention for the Control and Management of Ships' Ballast Water and Sediments and U.S. domestic policy. In my testimony, I briefly contrast the IMO convention with existing U.S. policy, and the terms proposed in the reauthorization legislation pending before these

Subcommittees, the National Aquatic Invasive Species Act (H.R. 1080) and the Aquatic Invasive Species Research Act (H.R. 1081). Next, I identify key features of the convention relevant to domestic policy and discuss their advantages and disadvantages. Finally, I make recommendations for Congressional action.

1. Relationship of the IMO Convention to U.S. Domestic Policy – Consistency with Important Distinctions

It will not be difficult for a Port state party to IMO to have policies consistent with the new IMO Convention. On the one hand, the convention explicitly allows party states to implement more aggressive policies than the terms of the convention. At the same time, as a practical matter, Port states that are party to the Convention may choose simply not to enforce terms within it. Moreover, the convention explicitly allows them to exempt certain voyage routes and regions at their discretion (IMO guidelines to be developed). To that extent the Convention serves as both a ceiling and a floor for Port state action.

Nonetheless, the Convention terms are not a good fit for existing U.S. law, largely because the law is outdated; there is greater compatibility with pending domestic regulation and legislation. In particular, if the U.S. ratifies the agreement, new implementing legislation would likely be needed because the National Invasive Species Act of 1996 offers ships the option of BWE in statute, while the Convention terms could lead to elimination of this option (albeit many years down the line). The USCG recently issued a proposed rule which would implement a system more consistent with that outlined in the Convention, and the reauthorization proposal for NISA currently pending before the Committee, the National Aquatic Invasive Species Act (NAISA), is also consistent with the Convention in this regard. Like the convention, the proposed USCG rule and NAISA would replace the guaranteed option of BWE with a performance standard leading to likely phase out of BWE.

The Convention and proposed U.S. domestic policy have other areas of great similarity. For example, all require ballast water exchange in the near term, Ballast Management Plans, reporting of ballast operations, and early implementation of treatment by new ships relative to existing ships.

Some distinctions between the Convention and current and pending U.S. domestic law exist but are nonetheless compatible as they pertain to the time-lag associated with the entry-into-force of the international agreement relative to domestic law. The NAISA proposal, for example, details an interim regulatory stage which would largely predate the IMO Convention entry into force. This interim regulatory stage preserves the option of BWE for ships, but sets forth a clear alternative regulatory approach for ships that choose treatment which can exceed the effectiveness of BWE as operationalized by a numeric standard. (The "final" regulatory stage contained in NAISA overlaps the Convention and USCG proposed rule terms in intent and time-frame. This final regulatory stage would establish and implement an environmentally protective standard for ballast treatment which is reviewed and revised over time.)

However, there are also differences between the terms of the Convention and pending U.S. policy that are both substantive and consequential. These differences pertain to specifics of ballast water exchange requirements, and regulation of ballast discharges. For example, the Convention contains a set of numeric standards for ballast discharge, while an environmentally protective standard for ballast discharge has not been defined under U.S. law. The USCG is seeking comment on a proposed set of options, and NAISA leaves a standard for the final regulatory stage to the agencies to define over a four year period supported by targeted research authorizations. Moreover, NAISA provides a goal for the standard of risk elimination, and requires that it address the whole ship (not just ballast water). Any standards issued are to be reviewed and revised periodically with these goals in mind. The Convention, in contrast, does not take a "whole ship" approach, and has no process for periodic review of the standards.

While there is little yet developed in USCG regulation on this matter, the Convention also takes a significantly different approach to proposed U.S. law in addressing the concern that technology may not exist to meet an environmentally protective standard by the deadlines proposed. NAISA provides agencies the option of creating a temporary performance benchmark consistent with the capabilities of available technologies economically achievable for each class of ship based on periodic technology surveys. Thus, the deadlines don't change, but the required performance could be initially less than the environmentally protective standard. In contrast, the Convention presumes that technologies will be available sooner for some types of ships than others, based on size, and stages deadlines for compliance with a standard accordingly. Moreover, it sets forth an open-ended pre-standard review process three years prior to the first imposition of a standard (as soon as 2005). At this forum, if cost-effective technology is not determined to be available to meet the standards, the IMO may vote to change any aspect of the convention, even, or most likely, the deadlines themselves.

Finally, the Convention and pending domestic policy differ substantially in the timing of implementation. While there is no clear time-frame yet in USCG regulation, the NAISA timeline for imposition of standard, 2006-2011 depending on the age of the ship, is far swifter than even the Convention's hoped for schedule (2008-2016), which, as stated earlier, is subject to change. Exhibit A is a chart summarizing these similarities and differences.

2. Advantages, Disadvantages and Recommendations for Domestic Policy Regarding Key Features of IMO Convention

2.1 IMO Ballast Water Exchange Requirements

The IMO convention will require ballast water exchange (BWE) of all ships following the convention's entry into force. Current U.S. policy (the National Invasive Species Act) already directs ships entering US ports to undertake BWE or an approved alternative; the regulatory program has been underway in the Great Lakes since 1992, and it is expected to begin for other U.S. ports by 2005. Proposed U.S. regulations for the national mandatory program stipulate that BWE be performed a minimum of 200 nautical miles from shore. NAISA would maintain the current U.S. geographic limits for BWE, but would add a performance standard for BWE (as well as a performance standard for the alternative treatment option). Ships using BWE must pump water for a period sufficient to assure a 95% ballast purge.

The approach of the IMO convention to implementing a ballast water exchange requirement differs from the U.S. approach in critical ways. Like NAISA, if fewer than three volumes exchange can achieve a 95% purge, fewer can be implemented by the ship master to meet the requirements of the Convention. However, unlike NAISA, no ship is required to do more than 3 volumes exchange, even if 3 volumes are insufficient to achieve a 95% purge. The Convention also expands the number of voyages in which BWE is a requirement by loosening the defining geographic strictures to allow BWE as close as 50 nautical miles from the nearest shore. Individual parties can allow exchanges even closer if it does not harm a neighboring party's waters. The disadvantage of this approach is that BWE may be carried out ineffectually or counterproductively in coastal zones.

Recommendation: Congress should a) require all ships using BWE to meet requirements to achieve 95% volume exchange as demonstrated by an initial dye test or model; b) not loosen the geographic limits on BWE consistent with the IMO convention unless research reveals BWE effectiveness in coastal environments; and c) encourage ballast treatment by ships engaged in near coastal voyages.

2.2 Ballast treatment standard in IMO Convention

2.2.1 Theory Supporting IMO Standard Approach

The IMO Convention contains a set of numeric performance standards for ballast treatment that is intended to be environmentally protective and readily monitorable. Current U.S. policy does not have a standard for ballast discharge, though the USCG has sought comment on three possible approaches. As noted earlier, NAISA defines an interim standard for treatment, but provides agencies flexibility in determining the environmentally protective ballast discharge standard, analogous to the standard in the IMO convention. NAISA gives agencies 4 years to finalize and publish the protective standard, which is then subject to periodic review and revision.

The IMO standard was derived using logic proposed by the Ballast Water Work Group of the International Council for the Exploration of the Sea (ICES). The ICES logic is that the standard should require a substantial reduction (at least 3 orders of magnitude) over the median observed concentrations of zooplankton and phytoplankton in untreated ballast discharge. The ICES Work Group compiled data from an eclectic set of existing studies -- all that was available -- to derive recommended numeric limits for zooplankton and phytoplankton in ballast discharge based on this approach. In determining the standard in the convention, the IMO accepted the ICES approach, and the data set, but altered the ICES numeric recommendations upward in response to negotiations. The IMO negotiators seemed to prefer to work with the mode (most common value) concentration as a starting point, rather than the median (middle value). The standards arrived at by the IMO group also substitute size ranges for taxonomic groupings (>50 micrometers, and >10 and < 50 micrometers, for zooplankton and phytoplankton, respectively). The IMO standard for zooplankton represents only a one log reduction from both the observed median and mode concentrations. The phytoplankton standard is virtually the same as the observed median concentration of microplankton, and just two orders of magnitude less than the mode. The IMO also added a set of limits for specific pathogenic microbes in ballast discharge.

The advantage of the ICES approach to deriving a discharge standard, if implemented, is that it would normalize all ballast discharge to a consistently low discharge density. Studies to date suggest great variability in the densities of organisms at discharge from ships' ballast systems. Studies conducted by the Northeast-Midwest Institute on the Great Lakes and the West Coast encountered variability in untreated discharge concentrations spanning 3 orders of magnitude, consistent with data set used by the ICES group. A percent reduction standard would not significantly alter such variability, just lower the numbers across the board. In addition, the ICES recommended approach adopted by the IMO will allow science to begin to estimate actual inoculation pressure in U.S. harbors, and help them assess levels of residual risk. From the standpoint of a treatment vendor, treatment systems would have to be designed quite conservatively to reliably meet such a standard given the extreme variability in natural organism densities in source harbors. Using the variability organism densities in untreated ballast discharge from the ICES-compiled data set as an illustration, a treatment system would have to deliver a 6 log reduction in zooplankton and a 7 log reduction in microplankton to reliably comply with the ICES-proposed standard under worst-case scenario densities. A 4 log and 3 log reduction, respectively, would be needed to meet the IMO negotiated outcome.

It must be acknowledged however, that the ICES/IMO approach to standard-setting is not truly science based in that it makes necessary assumptions in the context of very limited information regarding what discharge concentrations pose risk to receiving systems. Likewise, claims should not be made that it is environmentally protective. This approach assumes that high probability events (mode discharge densities) pose risk to the environment and must be reduced, and that a reduction in density from the mode value will yield a reduction in risk. The larger the reduction, the lower the risk. In fact, these assumptions may be wildly off-base and/or dependent upon the taxonomic group under discussion. For zooplankton,

high probability events (mode densities) already could constitute low risk, while low probability events (high-end densities) could constitute most of the problem. Alternatively, risk could be unrelated to density altogether, particularly in the case of bacteria and phytoplankton. If bacteria in ballast discharge are found to pose a threat to receiving systems (they may not), are the discharge limits in the IMO Convention adequate to make a difference? Is there any real difference in levels of protection that would be afforded by the numbers arrived at by the IMO for zooplankton versus the ICES recommendation and the U.S. position (which came in three orders of magnitude lower than the IMO standard)? Moreover, this approach to a standard also focuses only on ballast water of ships, while sea chests and ship hulls are being found to be of more and more concern to scientists as vectors for aquatic organisms. Is there true reduction in the risk of transfer of harmful organisms by ships if only one mode within a multiple-mode vector is limited?

It would be quite useful to know the relationship between risk and ballast discharge concentrations, but in fact, this relationship may never be knowable. For this reason, regulators must walk the line between adoption of conservative enough discharge limits to hedge bets against new invasions, and overly conservative estimates that unnecessarily limit the range of cost-effective and environmentally sound technologies available to achieve them. The standard-setting approach recommended by ICES is a reasonable way forward in that regard, provided the limits set forth can be shown to be at least environmentally meaningful, if not environmentally protective.

Finally, at some point in the future, this sort of standard could become "spot-check-friendly". A regulatory agency could take a standing sample of ballast discharge and determine if the ship is in compliance without regard to intake quality. Currently, however, there is no reliable means to enumerate precise numbers of live organisms (other than zooplankton) in a standing sample of ballast discharge, and it could require 5-10 years for this utopian sampling scenario to become a reality.

Recommendation: Congress should direct agencies to use the ICES approach to deriving a standard for ballast water, but also direct them to use a similar approach to setting standards for sea chests and ship hulls. A quality data set should be generated specifically to service this standard setting as noted below. In addition, if the IMO/ICES approach is to be adopted for U.S. domestic purposes, it also should be acknowledged that there is no current means to measure for compliance with such a standard in relation to smaller live organisms, bacteria, eggs and resting stages. Congress should authorize agencies to make arrangements for type approval and indirect monitoring during the near-term pending development of more efficient and direct approaches to monitoring in the long-term.

2.2.2 Data Set Supporting IMO Standard

The standard setting approach is rational, but the data set with which to implement the theory is not yet there. The IMO ballast discharge limits were negotiated in an information vacuum regarding the mean, median and mode organism concentrations currently discharged in untreated ballast globally. Scientists within ICES did the best that could be done to fill the gap with existing data, but the existing data were not generated for this purpose and cannot be reliably used in this way. Sampling and analysis inconsistencies between the studies call into question the validity of any comparison. As an example, one study took ten bucket samples (10 L each) of ballast water from each tank sampled. The water was then passed through a 55 micrometer plankton net. Other studies directly sampled ballast tanks using 80 micrometer plankton nets. The studies range widely in their attention to quantitative rather than qualitative outputs. Not all of the studies analyzed whether the zooplankton discharged were alive or dead, and only one analyzed phytoplankton viability. Moreover the size cut-offs substituted in the IMO formulation are not consistent with some of the studies' sampling approaches. The studies involving zooplankton collection using 80 micrometer nets did not collect or count organisms between 50 and 80 micrometers. None of the studies examined the pathogens contained in the IMO standards.

However, even if the data in these studies were generated consistently, across taxa, and "by the book" quantitatively speaking, the number of tanks, ships and voyages sampled is too small to support conclusions about mean, median and mode densities of organisms in ballast discharge. Geographic differences in biota, ballast water age, different operators evaluating samples, variation caused by season and ship type all spell the need for many more repetitions before conclusive information is generated.

The danger of such a preliminary data set is that it could create the illusion of a science basis, and generate treatment standards that are off-target, causing ship owners and vendors to invest in calibrating their treatments to an unproductive endpoint. Overly lenient standards are tantamount to no regulation (except for the expense of implementing and complying with them), while unnecessarily strict standards will not help the environment if the result is inadvertent perpetuation of BWE as the prevailing ballast water management method, while cost-effective and environmentally sound alternatives that meet the strict standard elude us.

Recommendation: Congress should direct agencies to conduct targeted research to refresh the data set supporting the IMO approach to a standard, and make it especially relevant to densities encountered in discharges to U.S. waters. A similar data set should be developed for coastal voyage discharges, sea chests, and hull fouling organisms. Particular attention should be given to the need for and reasonable approach to regulation of bacteria. Such a research program is laid out in large part in H.R. 1081. If a standard estimate is set in law based on today's data, Congress should make it easy to adjust the estimate pending better information (while using the same formula). If not, it should give agencies no more than 4 years to develop the standard (consistent with H.R. 1080).

2.2.3 Standards Set by IMO

As noted above, it is difficult to judge the relevance of the numeric limits which the IMO ultimately negotiated, or to counter-propose alternatives, given the weakness of links between discharge concentrations and risk, and of the existing data base. From the standpoint of a treatment designer, there is probably little difference between a target of 0.1, 1, and 10 zooplankton per cubic meter, if the before-treatment densities might range to over 100,000 organisms per cubic meter. In all three cases, the system will be designed to deliver 100 percent kill. The microplankton standard arrived at by the IMO has little to redeem it. It encumbers treatment system design to the extent that a partial kill or removal of these organisms is required, while it will deliver little or no meaningful reduction in risk of new introductions of these usually asexually reproducing organisms. Worst of all, it presents an impossible enforcement burden for regulators. The bacteria standards warrant similar criticisms.

Recommendation: If Congress sets a standard for ballast discharge in law, it should consider going to zero live organisms above 50 microns (given some level of probability) to simplify enforcement. The microplankton standard should be much stricter than the IMO's (by at least three orders of magnitude), and Congress should ask agencies to carefully review the merits of bacteria limits before imposing them at all. Once again, any standard set using the IMO/ICES approach should be conditioned on or tentative pending a refreshed and improved data set that focuses on discharges to U.S. waters.

3. Implementation Approach

The Convention and NAISA take significantly different approaches to addressing the concern that technology may not exist to meet an environmentally protective standard by the deadlines proposed. NAISA directs agencies to create a temporary performance benchmark consistent with the capabilities of available technologies economically achievable for each class of ship based on periodic technology surveys. No presumptions are made regarding the relative rate at which technologies may become available for the various classes and sizes of ships. The benchmark will ratchet up over time as vendors compete to

capture market share by exceeding the effectiveness of prevailing technology. The deadlines implementing a performance standard approach to ballast regulation, then, do not change, but the required performance could be initially less than the environmentally protective standard.

The Convention presumes that technologies will be available sooner for ships with smaller ballast capacity than those with larger ballast capacity, and stages deadlines for compliance with a standard accordingly. The latter assumption may not only be untrue, it may inadvertently delay the infusion of the substantial resources of large ship owners to help solve the ballast treatment question. It certainly creates less incentive for vendors to invest in development of treatments for larger ships in the near term.

Moreover, the Convention sets forth an open-ended pre-standard review process three years prior to the first imposition of a standard (as soon as 2005). At this forum, if cost-effective technology is not determined to be available to meet the standards, the IMO may vote to change any aspect of the convention, even, or most likely, the deadlines themselves. During the (potentially extended) period prior to imposition of the IMO treatment standard, a ship owner may install treatment in lieu of BWE, but only if it is shown to meet the ultimate standard. In other words, it is an all-or-nothing proposition for treatment from the start, and nothing could well be the long-term outcome.

It is a true achievement that the Convention contemplates holding new ships first, and ultimately all ships, to a ballast discharge performance standard. However, the protracted time-line, open ended pre-review process, and the unnecessary presumption that more time will be needed for large ballast capacity ships to comply relative to smaller ships, detract from the Convention's value for purposes of domestic policy.

Recommendations: The best approach to solving the problems associated with uncertain technology development is laid out in NAISA. NAISA directs agencies to set and ratchet upward a performance benchmark based on best available technology economically achievable. This approach is an improvement on past "Best Available Technology" approaches in that the performance benchmark, not a technology, is the operative regulatory feature. Any technology that meets or exceeds that performance benchmark is allowable, and periodic surveys of treatments available for new and existing ships within the major classes will facilitate the steady upward ratcheting of that benchmark.

4. Other Features of the Convention

Two more aspects of the Convention warrant discussion. First, there is a great need for the U.S. to pursue regional agreement with and provide technology assistance to our neighbors as part of our national policies to prevent ship-mediated transfers into U.S. waters of harmful aquatic organisms. Because the Convention does provide such flexibility to Port states to implement more or less than the Convention prescribes, regional agreements among neighboring nations becomes extremely important. If the U.S. adopts more aggressive policies within or outside the Convention framework, the investment could be compromised if Canada or Mexico fail to enforce or otherwise weaken implementation. This fact is especially true for the border areas, including the Great Lakes, Puget Sound, the Caribbean, Southern California, and the Gulf of Mexico. It should be noted that the Great Lakes region offers a unique proving ground for treatments for smaller bulk cargo vessels. The maritime community is well motivated and receptive to being part of the solution rather than the problem.

Second, the Convention places requirements on party states to gain approval of the IMO before using any chemical treatment processes. This precaution is understandable given the potential for discharge of toxic residuals by one party in the waters of another party in the name of ballast treatment. Indeed, one state within the U.S. might have similar concerns about residuals originating with treatment of water in another state. Still, it is unlikely that an international review process would be more effective

and efficient than a U.S. domestic review process. Current U.S. law stipulates that ballast treatments approved by the USCG be environmentally sound, but there is no process in place for the USCG to make that determination. A clear U.S. process for reviewing environmental soundness of all proposed ballast treatments would help ships visiting U.S. ports to meet U.S. law, and would serve to guide international efforts to set up a workable and effective screening process for more global application.

Recommendation: Congress should direct the State Department to enter into negotiations with Canada, Mexico, and other neighboring nations to develop a regional agreement on prevention of ship-mediated transfers of aquatic invasive organisms. It should direct resource agencies to provide technical assistance to these neighboring nations to assist in implementation of the agreed policies. Finally, Congress should direct the Environmental Protection Agency to develop criteria for environmental soundness of ballast treatment and the USCG and EPA should use these criteria to screen potential ballast treatments prior to granting approval for their use.

5. Conclusions and Summary of Recommendations

In conclusion, there are some similarities but also striking differences between the recent IMO Convention on ballast water and existing and proposed U.S. policy. Given flexibility and ambiguity built into the Convention, most decisions remain in the hands of Congress regarding U.S. policy to prevent ship-mediated transfers of aquatic organisms, irrespective of its decision to ratify the agreement. It is critical that the U.S. step forward with a detailed and effective national program to prevent new introductions of aquatic invasive species by ships. A credible U.S. federal effort will help to stabilize the regulatory landscape domestically, and will provide leadership and experience to the global community in support of implementation of the international convention.

I respectfully submit the following recommendations for U.S. legislation to regulate the ship vector of aquatic invasive species as effectively and efficiently as possible:

- Ballast Water Exchange: Congress should a) require all ships using BWE to meet requirements to achieve 95% volume exchange as demonstrated by an initial dye test or model; b) not loosen the geographic limits on BWE consistent with the IMO convention unless research reveals BWE effectiveness in coastal environments; and c) encourage ballast treatment by ships engaged in near coastal voyages.

- Ballast Treatment Standard Approach: Congress should direct agencies to use the ICES approach to deriving a standard for ballast water, and direct them to use similar approaches to setting standards for sea chests and ship hulls. It should also direct agencies to make arrangements for type approval and indirect monitoring during the near-term pending development of more efficient and direct approaches to monitoring in the long-term.

- Data Set Supporting Standard Derivation: Congress should direct agencies to conduct targeted research to refresh the data set supporting the IMO approach to a standard, and make it especially relevant to densities encountered in discharges to U.S. waters. A similar data set should be developed for coastal voyage discharges, sea chests and hull fouling organisms. Particular attention should be given to the need for and reasonable approach to regulation of bacteria. If a standard estimate is set in law based on today's data, Congress should make it easy to adjust the estimate pending better information (while using the same formula). If not, it should give agencies no more than 4 years to develop the standard.

- Numeric Standard Contained in Convention: If Congress sets a preliminary standard for ballast discharge in law based on the IMO approach, it should consider going to zero live organisms above 50 microns (given some level of probability) to simplify enforcement. The microplankton standard should be much stricter than the IMO's (by at least three orders of magnitude), and Congress should ask agencies to carefully review the merits of bacteria limits before imposing them at all. Once again, any standard set using the IMO/ICES approach should be conditioned on or tentative pending a refreshed and improved data set that focuses on discharges to U.S. waters.

- Implementation of Standard: Congress should direct the USCG and EPA to implement the environmentally protective "final standard" using a modified best available technology approach. Agencies should be directed to set a performance benchmark for treatment for each class of new and existing ships based on what technology can deliver. Any technology that meets or exceeds that performance benchmark is allowable, and periodic surveys of treatments available for new and existing ships within the major classes will facilitate the steady upward ratcheting of that benchmark.

- Regional Agreements: Congress should direct the State Department to enter into negotiations with Canada, Mexico, and other neighboring nations to develop a regional agreement on prevention of ship-mediated transfers of aquatic invasive organisms. It should direct resource agencies to provide technical assistance to these neighboring nations to assist in implementation of the agreed policies.

- Environmental Soundness: Congress should direct the Environmental Protection Agency to develop criteria for environmental soundness of ballast treatment and the USCG and EPA should use these criteria to screen potential ballast treatments prior to granting approval for their use.

I wish to once again thank the Subcommittees for holding this hearing and inviting me to testify. A careful look at federal policy around the issue of ship-mediated transfers of invasive organisms is critical and justified. At the same time, it should be noted that ships are not the only significant vector of new introductions into U.S. waters. I urge the Subcommittees to do what they can to motivate progress on other aspects of the problem under the jurisdiction of the House Resources Committee, as well. If the Subcommittees Members or their staff have any questions, I am happy to provide any follow-up information you may require.

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- Ballast Treatment Standard Approach: Congress should direct agencies to use the ICES approach to deriving a standard for ballast water, and a similar approach to setting standards for sea chests and ships hulls. It should also direct agencies to make arrangements for type approval and indirect monitoring during the near-term pending development of more efficient and direct approaches to monitoring in the long-term.
- Data Set Supporting Standard Derivation: Congress should direct agencies to conduct targeted research to refresh the data set supporting the IMO approach to a standard, and make it especially relevant to U.S. waters. A similar data set should be developed for coastal voyage discharges, sea chests and hull fouling organisms. Particular attention should be given to the need for and reasonable approach to regulation of bacteria. If a standard estimate is set in law based on today's data, Congress should make it easy to adjust the estimate pending better information (while using the same formula). If not, it should give agencies no more than 4 years to develop the standard.
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- Implementation of Standard: Congress should direct the USCG and EPA to implement the environmentally protective "final standard" using a modified best available technology approach. Agencies should be directed to set a performance benchmark for treatment for each class of new and existing ships based on what technology can deliver. Any technology that meets or exceeds that performance benchmark is allowable, and periodic surveys of treatments available for new and existing ships within the major classes will facilitate the steady upward ratcheting of that benchmark.
- Regional Agreements: Congress should direct the State Department to enter into negotiations with Canada, Mexico and other neighboring nations to develop a regional agreement on prevention of ship-mediated transfers of aquatic invasive organisms. It should direct resource agencies to provide technical assistance to these neighboring nations to assist in implementation of the agreed policies.
- Environmental Soundness: Congress should direct the Environmental Protection Agency to develop criteria for environmental soundness of ballast treatment and the USCG and EPA should use these criteria to screen potential ballast treatments prior to granting approval for their use.

Exhibit A:
Comparison of key features of IMO Convention with pending US domestic policy:

	IMO Convention	USCG Regulations	NAISA
Imposition of Best Management Practices	Yes	Proposed	Proposed
Requirements for Ballast Management Plans	Yes	Proposed	Proposed
Reporting of ballast operations	Yes	Proposed	Proposed
Performance standard for BWE	Maximum of 3 tank volumes regardless of 95 % exchange	Volume equal to 3 tank volumes for flow-through or 1 empty-refill (Existing for GL, proposed nationally)	Proposed standard of 95 % volumetric exchange
Performance standard for BWT	Numeric standards predicting environmental protectiveness. Whole ship not addressed	3 alternatives proposed. Whole ship not addressed	Proposed goal of risk elimination. 4 years to determine. Whole ship addressed
Earlier compliance with BWT standard for new ships	Yes	Not addressed	Proposed
BWT type approval and spot checks	To be discussed	Not addressed	Proposed
Availability of BWT technologies to meet standard	Presumes technologies will be available sooner for some types of ships than others; pre-standard review escape hatch allowing delay	Not addressed	Proposed option of creating temporary performance benchmark for available technologies
Post BWT standard review	Not addressed	Not addressed	Proposed periodic review and revision
BWT standard implementation timeline	2008 to 2016; subject to review and change	Not addressed	Proposed imposition 2006 - 2011